

## Introduction

Intersil has recently introduced the ISL12058 Real Time Clock (RTC) devices. The ISL12058 is a basic RTC that provides:

- Real Time Clock/Calendar
  - Tracks Time in Hours, Minutes, and Seconds
  - Day of the Week, Date, Month, and Year
- 4 Selectable Frequency Outputs
- Alarm Function
- 4 Package Options
  - 2mmx2mm  $\mu$ TDFN
  - 3mmx3mm TDFN
  - 8 Ld SOIC
  - 8 Ld MSOP

The features are detailed in the data sheets. This Technical Brief provides information for an engineer wishing to use the ISL12058 as an alternative replacement for the ISL1208 and ISL12082.

## Advantages and Disadvantages of Replacing the ISL1208 with the ISL12058

Things to consider if you wish to replace the ISL1208 with the ISL12058.

### ADVANTAGES:

- Lower operating current (500nA vs 1.2 $\mu$ A @  $V_{DD} = 3.0V$ )
- Lower  $V_{DD}$  operating range (1.4V vs 2.7V)
- Dual Alarms with every second interrupt on Alarm1 and every minute interrupt on Alarm2.
- Same RTC registers setup and similar Control and Status register setup
- Smaller package option ( $\mu$ TDFN))
- Lower cost

### DISADVANTAGES:

- No battery backup
  - A system requiring battery backup can implement a slight hardware change and use a BAT54C Schottky Diode on  $V_{DD}$  to accept a regular input voltage and battery voltage. Figure 1 shows the example circuit of using the BAT54C on  $V_{DD}$ .
- Maximum  $V_{DD}$  operating voltage is 3.6V
  - A system that has the I<sup>2</sup>C lines pulled up to 5.5V (or other voltage higher than 3.6V), but has a 3.3V regulator on board requires a simple modification to connect the  $V_{DD}$  to 3.3V instead of 5.5V. Figure 2 shows an

example circuit with  $V_{DD}$  to 3.3V, and I<sup>2</sup>C lines and  $\overline{IRQx}$  pulled up to 5.5V

- A system that cannot connect  $V_{DD}$  to a voltage lower than 3.6V can use a Zener diode on the  $V_{DD}$  pin to lower the  $V_{DD}$  to 3.6V or below. Figure 3 shows an example circuit with a Zener diode to lower the 5.5V input voltage to 3.3V for  $V_{DD}$ .
- No ATR and DTR registers for oscillator frequency trimming
- 4 selectable frequency outputs and slight software change to select frequency output
  - ISL12058: The 4 selectable frequency outputs are 32.768kHz, 8.192kHz, 4.096kHz and 1Hz. The two FO bits to select the frequency outputs are located at bit 4 and 3 in address 08h.
  - ISL1208: 15 selectable frequency outputs. The four FO bits to select the frequency outputs are located at bit 3, 2, 1 and 0 in address 08h.
- Slight software change for Alarm1 interrupt on  $\overline{IRQ}/F_{OUT}$  pin
  - ISL12058: To enable Alarm1 interrupt on  $\overline{IRQ}/F_{OUT}$  pin, IRQE and A1E bits in address 08h have to be set to "1".
  - ISL1208: To enable Alarm interrupt on  $\overline{IRQ}/F_{OUT}$  pin, all the FO3, FO2, FO1, and FO0 bits in address 08h have to be set to "0".
- No IM bit to enable the Alarm's Repetitive/Recurring Time Event.

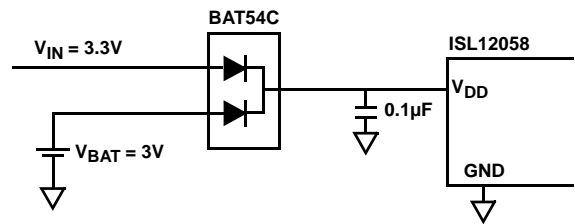


FIGURE 1. EXAMPLE CIRCUIT FOR SYSTEM REQUIRING BATTERY BACK-UP BY USING BAT54C ON  $V_{DD}$

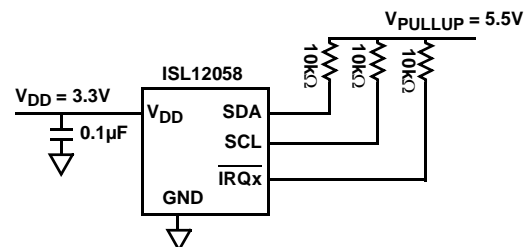


FIGURE 2. EXAMPLE CIRCUIT WITH  $V_{DD}$  AT 3.3V AND I<sup>2</sup>C AND  $\overline{IRQx}$  PULLED UP TO 5.5V

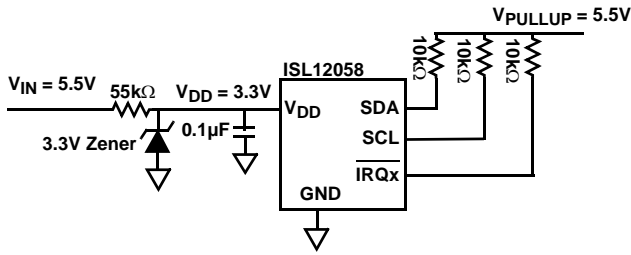


FIGURE 3. EXAMPLE CIRCUIT WITH ZENER DIODE ON V<sub>DD</sub> TO REDUCE INPUT VOLTAGE TO 3.3V

**Advantages and Disadvantages of Replacing the ISL12082 with the ISL12058**

Things to consider if you wish to replace the ISL12082 with the ISL12058.

**ADVANTAGES:**

- Lower Operating Current (500nA vs 1.6µA @ V<sub>DD</sub> = 3.0V)
- Lower V<sub>DD</sub> Operating Range (1.4V vs 2.7V)
- Dual Alarms with every Second Interrupt on Alarm1 and every Minute Interrupt on Alarm2.
- Same RTC Registers Set-up and Similar Control and Status Register Set-up
- Smaller Package Option (µTDFN))
- Lower Cost

**DISADVANTAGES:**

- No Battery Backup
  - A system requiring battery back-up can implement a slight hardware change and use a BAT54C Schottky Diode on V<sub>DD</sub> to accept a regular input voltage and battery voltage. Figure 1 shows the example circuit of using the BAT54C on V<sub>DD</sub>.
- Maximum V<sub>DD</sub> Operating Voltage is 3.6V
  - A system that has the I<sup>2</sup>C lines pulled up to 5.5V (or other voltage higher than 3.6V), but has a 3.3V regulator on board requires a simple modification to connect the V<sub>DD</sub> to 3.3V instead of 5.5V. Figure 2 shows an example circuit with V<sub>DD</sub> to 3.3V and I<sup>2</sup>C lines and IRQx pulled up to 5.5V.
  - A system that cannot connect V<sub>DD</sub> to voltage lower than 3.6V can use a Zener diode on the V<sub>DD</sub> pin to lower the V<sub>DD</sub> to 3.6V or below. Figure 3 shows an example

- circuit with a Zener diode to lower the 5.5V input voltage to 3.3V for V<sub>DD</sub>.
- One Interrupt Output for Alarm Interrupt and Frequency Output
  - IRQ/F<sub>OUT</sub> is available for alarm interrupt and frequency output.
  - IRQ2 is not available in ISL12058.
- Requires Hardware Change for pin-to-pin Compatibility
  - 8 Ld SOIC: Relocating GND pin to pin 4 to match ISL12058 pinout.
  - 10 Ld MSOP: Removing pin 5 and 6 to match ISL12058 pinout.
- No Timer feature
- No ATR and DTR Registers for Oscillator Frequency Trimming
- No Sub-Second feature
- Slight Software Change for Alarm1 Interrupt on IRQ/F<sub>OUT</sub> Pin
  - ISL12058: To enable Alarm1 interrupt on IRQ/F<sub>OUT</sub> pin, the IRQE and A1E bits in address 08h have to set to "1".
  - ISL12082: To enable Alarm interrupt on IRQ/F<sub>OUT</sub> pin, IRQ1E bit in address 08h has to set to "1".
- No IM Bit to Enable the Alarm's Repetitive/Recurring Time Event.

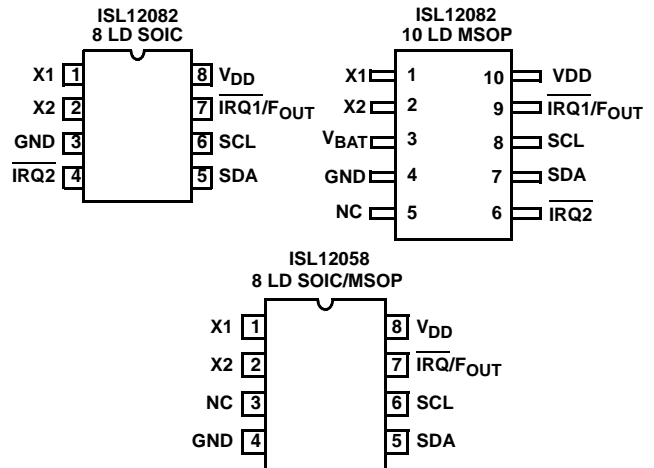


FIGURE 4. PINOUTS OF ISL12058's 8 LD SOIC AND MSOP PACKAGES AND ISL12082's 8 LD SOIC AND 10 LD MSOP PACKAGES

Intersil Corporation reserves the right to make changes in circuit design, software and/or specifications at any time without notice. Accordingly, the reader is cautioned to verify that the Application Note or Technical Brief is current before proceeding.